

A Revision of Plants Hitherto Referred to *Bistorta milletii* (Polygonaceae) in Nepal

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Plants hitherto referred to *Bistorta milletii* H.Lév. in Nepal are different from the typical *B. milletii* described from SW. China. The Nepalese plants include two distinct species. One should be called as *Bistorta confusa* (Meisn.) Greene, which has been overlooked or misapplied to different species in previous works, and is growing in eastern to central Nepal eastward from Kali Gandaki Valley. The other is a new species, *Bistorta rubra* Yonekura & H.Ohashi, and is distributed from northern India to western Nepal westward from Kali Gandaki Valley. *Bistorta rubra* is considered to be related to *B. sherei* H.Ohba & S.Akiyama in central to eastern Nepal. *Bistorta milletioides* H.Ohba & S.Akiyama, distinct from the above taxa, is proved to be distributed in central to eastern Nepal.

Key words: taxonomy, *Bistorta milletii*, Polygonaceae, Nepal, new species.

Bistorta milletii H.Lév. was described from Yunnan Province, southwestern China (Léveillé 1913). It is characterized in having a short thick rhizome, winged petiole of radical leaves and large reddish purple flowers. Plants with similar characters have been reported from Nepal under the same name (Hara 1975, 1982, Malla et al. 1976, Polunin and Stainton 1984, Stainton 1988). The Nepalese plant is, however, different from the typical *B. milletii* of China. The aim of this paper is to make clear identity of Nepalese plants referred to *B. milletii*.

Materials and Methods

Field observations were made by the first author in Kali Gandaki Valley, central Nepal, in 1995, and in Dhaulagiri–Dhorpatan region, western Nepal, in 1996. Collected plants were dried to make her-

barium specimens and some inflorescences were preserved in FAA. Living plants collected in 1996 have been cultivated in the Experimental Garden of Biological Institute, Tohoku University, Sendai. Voucher specimens collected in 1995 and 1996 are deposited in TUS (the abbreviations of Herbaria are after Holmgren et al., 1991).

To clarify morphological characters and the distribution ranges of the Nepalese plants, many herbarium specimens preserved in A, BM, E, GH, K, KANA, KATH, KYO, MAK, NY, P, TI, TNS and TUS were also investigated.

Results and Discussion

Two distinct plant groups are easily recognizable in the Nepalese plants hitherto referred to *Bistorta milletii*. These are here arbitrarily named Group A and Group B re-

spectively. The Group A is characterized by the well branched stem, amplexicaul upper cauline leaves with ochreae much shorter than the subsequent leaf sheaths (Fig. 1-1) and inflorescence with one reddish purple flower in each node, while the Group B is characterized by the simple stem, linear or lanceolate and not amplexicaul upper cauline leaves with ochreae equal to or longer than subsequent leaf sheaths (Fig. 1-2) and inflorescence with one or two deep red or rarely deep pink flower(s) in each node. Flowers of *Bistorta milletii* (Fig. 1-8) is larger (the perianth 5–6.5 mm long) from those of Nepalese plants whose perianths are less than 5 mm long (5–7 in Fig. 1). Moreover, *B. milletii* is different from the Group A in having a simple stem and lanceolate,

not amplexicaul upper cauline leaves (Fig. 1-3), and from the Group B in having lanceolate cauline leaves with ochreae much shorter than subsequent leaf sheaths (Fig. 1-3) and reddish purple flowers.

Bistorta milletii and the Group B have lustrous achenes ovate or oblong, trigonous with conspicuous ridges. This type of achenes is common in this genus, while the most plants of the Group A have achenes of somewhat anomalous shape, greenish, not lustrous, thinly ovoid and with obscure three ridges (Fig. 7-l). A few specimens of the Group A (for example, Stainton et al. 8656 (BM)) with brownish lustrous achenes with conspicuous three ridges (Fig. 7-k) are also found.

In the Group A the apex of pedicel is ex-

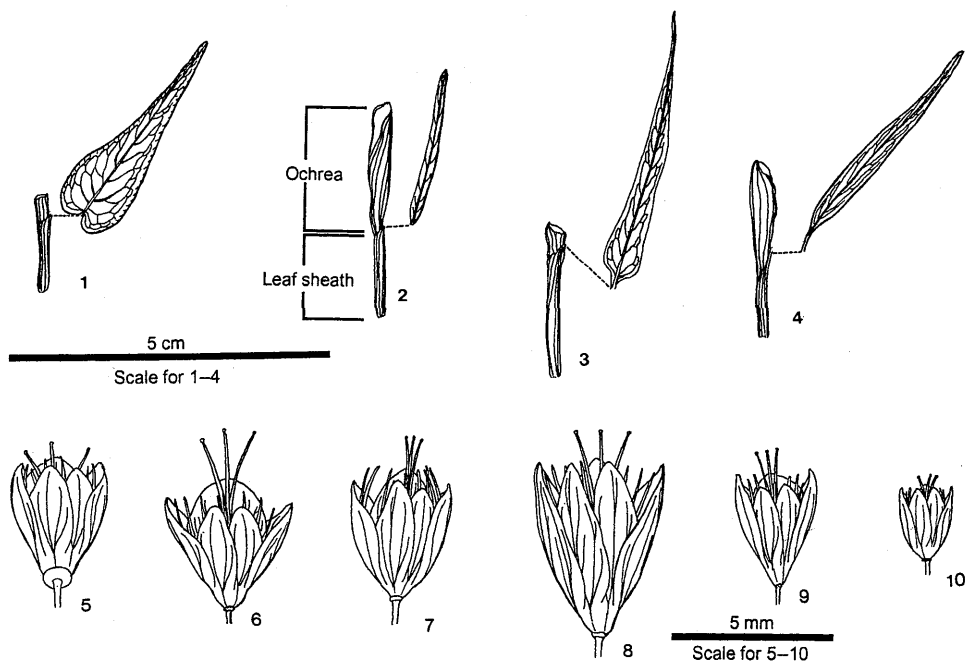


Fig. 1. Upper cauline leaves (1-4: Leaf sheaths and ochreae are separately figured for the convenience of explanation) and flowers (5-10) of *Bistorta milletii* in SW. China and allied species in Nepal. 1, 5, 6: *Bistorta confusa*. 2, 7: *B. rubra*. 3, 8: *B. milletii*. 4, 9: *B. milletioides*. 10: *B. sherei*. Voucher specimens: 1, 5: Mikage et al. 9552198 (TUS). 2: Stainton et al. 3330 (TI). 3, 8: Murata et al. 604 (TUS). 4: Miyamoto et al. 9410258 (TNS). 6: Stainton 7219 (E). 7: Mikage et al. 9682662 (TUS). 9: Ohba et al. 9110184 (TI). 10: Suzuki et al. 9470328 (TUS).

panded and covers the base of flower (Figs. 1-5, 6). There is a geocline in size of the appendage. Plants from the Ghorepani, the westernmost habitat of the Group A, have large cup-like appendages 3–5 times thicker than the middle parts of pedicels (Fig. 1-5), while those from habitats eastward from Gosainkund have much smaller ones (Fig. 1-6). Plants from eastern Annapurna Himal and Ganesh Himal has appendages intermediate between the two cited above in size. The apex of pedicel is more or less expanded in the most species of *Bistorta*, but it scarcely forms a cup-like appendage as seen in the Group A.

The Group A is distributed in central to

eastern Nepal eastward from Kali Gandaki valley, while the Group B is distributed in western Nepal to Garhwal in northern India westward from Kali Gandaki valley (Fig. 2).

The Group B is similar to *Bistorta milletioides* H. Ohba & S. Akiyama described from eastern Nepal in having long ochreae of upper cauline leaves (Fig. 1-4), but different by its stem (erect to ascending in the former vs. usually pendulous in the latter), leaves (ascending, glabrous or pubescent but not tomentose beneath vs. pendulous, usually tomentose beneath) and flower colour (deep red rarely deep pink vs. usually pink rarely white or reddish pink). *Bistorta milletioides* is distributed in central to east-

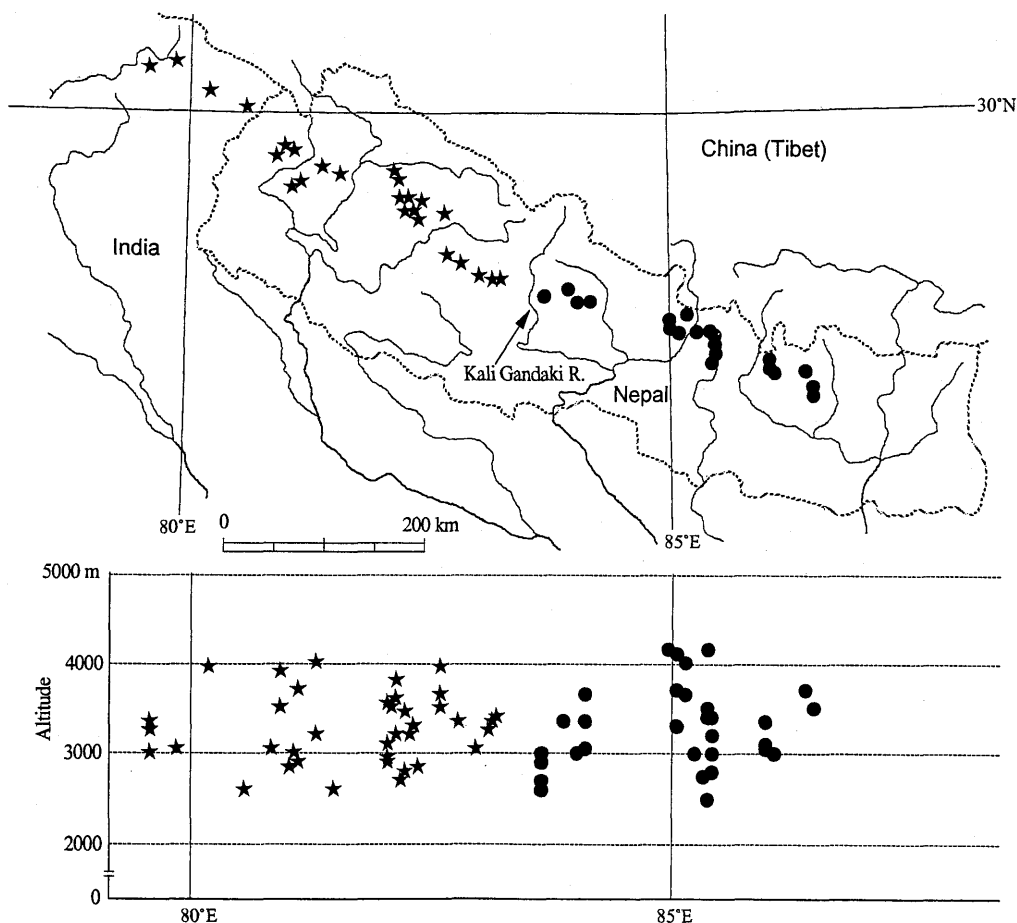


Fig. 2. Distribution of *Bistorta confusa* (●) and *B. rubra* (★) in Nepal and India.

ern Nepal, close to the area of the Group A, but the former tends to grow in higher elevations than the latter (Fig. 3). *Bistorta milletioides* is growing on rocky slopes or cliffs, while *B. milletii*, the Group A and the Group B grow in grasslands and forest margins.

Bistorta sherei H. Ohba & S. Akiyama described from eastern Nepal is distributed in central to eastern Nepal as shown in Fig. 3. This species is similar to the Group B in leaf venations, long ochreae equal to or longer than subsequent leaf sheathes in upper cauline leaves, and flower characters. They are, however, different from each other in habits (small usually less than 15 cm high

in *B. sherei* vs. large usually more than 18 cm high in the Group B), the shape of radical leaves (linear, usually less than 5 mm wide vs. narrowly oblong, more than 5 mm wide) flower sizes (more than 3.5 mm vs. less than 3.5 mm in length of the perianth) and the length of connate parts at the base of styles (usually $2/5-1/2$ vs. less than $1/3$). Both are morphologically distinct as shown in Fig. 5. *Bistorta sherei* and the Group B are geographically isolated from each other, and the former is growing at higher elevations than the latter (Figs. 2, 3).

A key to the Group A, the Group B, *Bistorta milletii*, *B. milletioides* and *B. sherei* is provided based on the above dis-

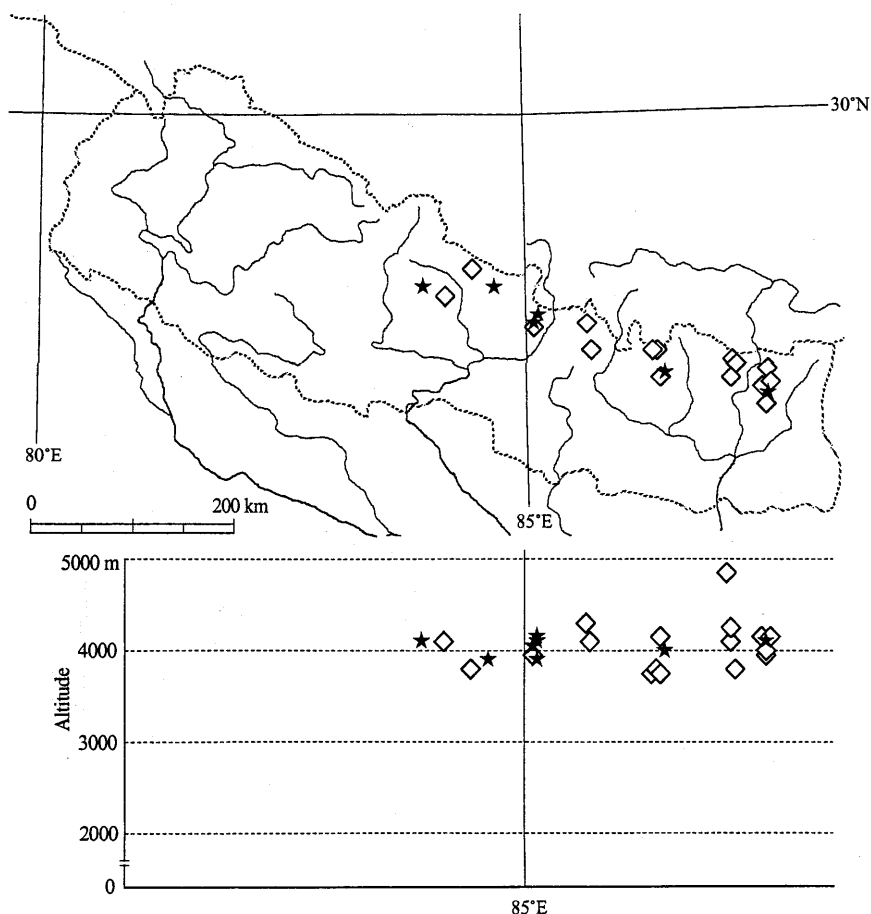


Fig. 3. Distribution of *Bistorta milletioides* (◇) and *B. sherei* (★) in Nepal.

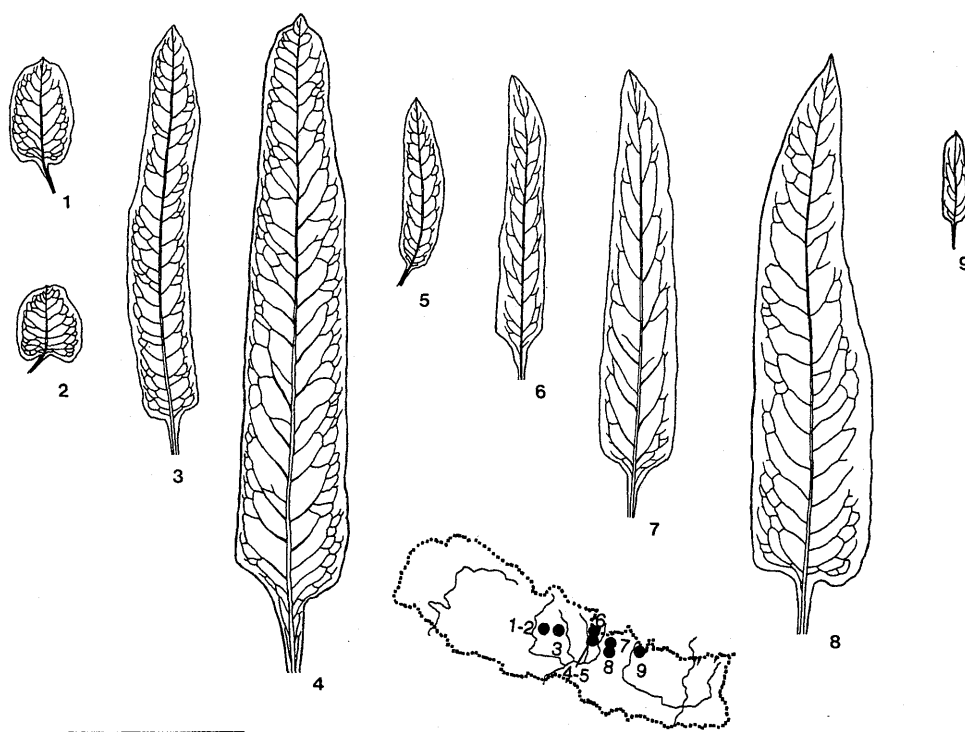


Fig. 4. Variations of radical leaves of *Bistorta confusa*, with distribution map of the vouchers.

Voucher specimen: 1; Mikage et al. 9490576 (TUS). 2; Mikage et al. 9552184 (TUS). 3; Stainton et al. 5993 (BM). 4; Miyamoto et al. 9410257 (TNS). 5; Stainton 5108 (BM). 6; Polunin 1459 (BM). 7; Kanai & Malla 674656 (TI). 8; Grey-Wilson & Phillips 145 (K). 9; Kanai et al. 675137 (TI). Scale Bar = 5 cm.

cussion as follows:

1. Stems branched, branches sometimes taller than the stem and bear small cauline leaves. Upper cauline leaves amplexicaul. Each node of an inflorescence bears one flower. Apex of pedicel much expanding usually forming cup-like appendage

..... Group A

1. Stems simple (rarely branched in *Bistorta millettioides*). Upper cauline leaves not amplexicaul. Each node of an inflorescence bears one or two flowers. Apex of pedicel more or less expanding but not forming cup-like appendage.

2. Ochreae of the highest cauline leaves much shorter than subsequent leaf sheathes. Flowers larger, 5–6.5 mm long

..... *Bistorta milletti*

2. Ochreae of the highest cauline leaves equal to or longer than subsequent leaf sheathes. Flowers smaller, 3.4–5 mm long.

3. Erect herb growing on grasslands. Leaves ascending, glabrous or pubescent but not tomentose beneath, veinlets thickened at margin.

4. Radical leaves narrowly oblong, wider than 5 mm. Inflorescences thicker than 10 mm. Flowers larger than 3.5 mm, deep red rarely deep pink. Base of style connate at 2/5–1/2 of their length

..... Group B

4. Radical leaves linear, narrower than 7 mm. Inflorescences thinner than 10 mm. Flowers smaller than 3.5 mm, white, pink to red. Base of style con-

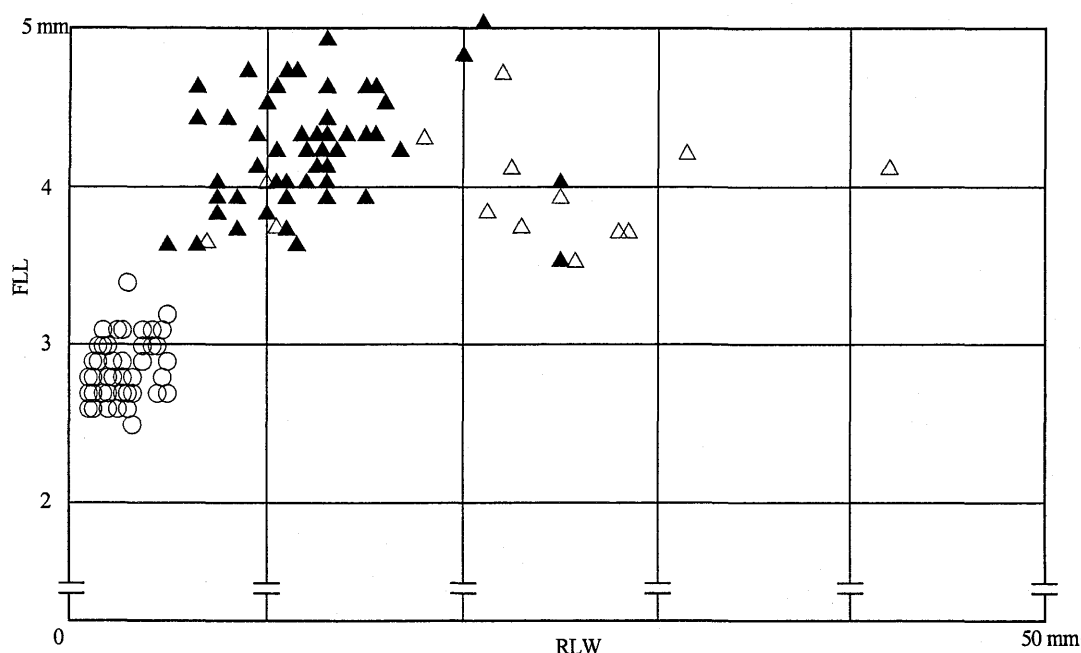


Fig. 5. Scatter diagrams showing variation ranges of RLW (width of the longest radical leaf in each individual) vs. FLL (length of the perianth of the largest flower in each individual) in *Bistorta rubra* (▲ △) and *B. sherei* (○). △: Plants from Jumla and Mugu Districts in northwestern Nepal. ▲: Plants from other areas.

nate at 1/4–1/3 of their length

.....*B. sherei*

3. Pendulous herb growing on rocky slopes. Leaves pendulous, sometimes falcate, usually tomentose beneath, veinlets usually flat and obscure at margin *B. millettioides*

In conclusion, *Bistorta milletii*, the Group A and the Group B are regarded as distinct species respectively.

Shape of radical leaves in the Group A is variable as shown in Fig. 4. Blades of radical leaves of plants from Ghorepani in central Nepal (1–2 in Fig. 4) are ovate or sometimes orbicular which are quite different from cauline leaves, while those from other place in central Nepal (3–9 in Fig. 4) are usually lanceolate to narrowly oblong.

In the Group B leaves are tend to be larger in plants from northwestern Nepal

(Jumla and Mugu Districts) than those from other areas (Fig. 5), although leaves are variable in size even in one population.

Nomenclatural notes

For applications of earlier names to the Groups A and B, it is necessary to clarify nomenclatural problems of Himalayan *Bistorta* species published under *Polygonum*.

Polygonum confusum was described by Meisner (1832) based on four specimens included in Wall. Cat. no. 1683 from "Gossain Than" (Gosainkund located north of Kathmandu, central Nepal) and northern India preserved in the East Indian Herbarium of the Linnean Society, but this Herbarium was sold by the Society long ago and these specimens are no longer traceable (Hedberg 1997). The original description of this species clearly shows that it has branched stems and amplexicaul upper

cauline leaves. These characters are referable to the Group A which is growing in and around Gosainkund. Moreover, several specimens of the Group A are found in the duplicates of Wall. Cat. 1683. One of which in G-DC (IDC Microfische was observed) was annotated by Meisner as *Polygonum confusum*. This specimen is regarded to a possible isosyntyple. We found the other three Wallich specimens (Cat. no. 1683) in E including the plants of the Group A, but they all bear no Meisner's annotations. IDC Microfische of Wallich Herbarium in Kew (K-W) does not include the Group A nor plants coincide with the original description of *P. confusum*. There is a specimen of the Group A in the Meisner Herbarium in NY annotated by Meisner as "*Polygonum confusum* Meisn." (Fig. 6). Although this specimen lacks any collection data and Park (1987) did not mention this specimen, this might be a duplicate of original material of

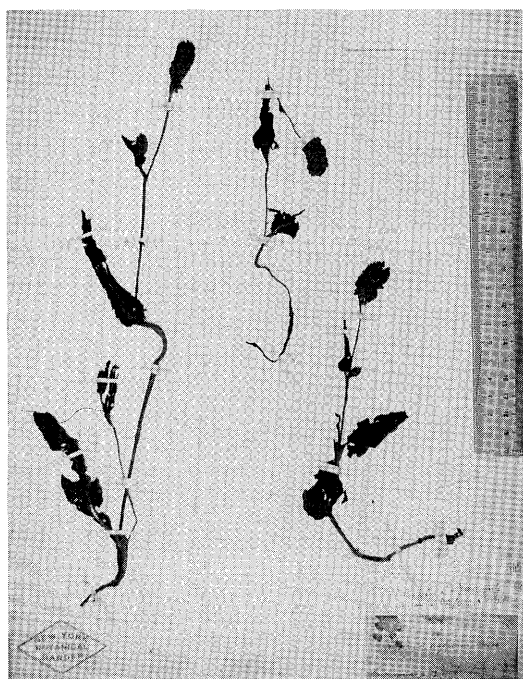


Fig. 6. Possible isosyntyple of *Polygonum confusum* Meisn. in NY.

P. confusum. It is obvious that Meisner named *P. confusum* for the Group A.

Polygonum paleaceum Wall. was named for a Wallich collection (Wall. Cat. no. 1684) from Khasi Hills, eastern India (Wallich 1829), but this name was not validly published by Wallich himself. This plant belongs to the species different from the Group A and is widely distributed in the temperate to subalpine regions of southwest China and mountains of southeast Asia other than east India, but not distributed in the Himalayas.

Meisner (1856) erroneously reduced *Polygonum confusum* and *P. paleaceum* (nom. nud.) to *P. bistorta* L. β . *angustifolium* Meisn.; this treatment caused subsequent nomenclatural confusions. Hooker (1886) validly published *Polygonum paleaceum* based on the specimens collected from Khasi Hills (as Khasya Mts.) including the Wallich specimen Cat. no. 1684 but cited *P. confusum* as a synonym. Accordingly, the name *Polygonum paleaceum* Wall. ex Hook.f. is illegitimate (Greuter 1994; Art. 52.1). Forbes and Hemsley (1891) and Dammer (1901) used *Polygonum confusum* for Hooker's *P. paleaceum* (1886). Samuelsson (1929) neglected *P. confusum* and used *P. paleaceum* for the same taxon. Recent Chinese floras follow Samuelsson's treatment (1929). On the other hand, the name *Polygonum confusum* Meisn. based on the Himalayan materials have been neglected in recent Himalayan floras. But it is clear that this name should be adopted to the Group A. Under the genus *Bistorta*, the name of the Group A is *Bistorta confusa* (Meisn.) Greene. Plants called as *Polygonum paleaceum* Wall. ex Hook.f. should be applied to another name. The correct name of this taxon will be discussed in our forthcoming paper.

Polygonum splendens Klotzsch from Himalaya is similar to the Group B, but this name was published only as a synonym of

Polygonum bistorta β *angustifolium* (Meisner 1856, Klotzsch and Garcke 1862). Moreover, judging from plate (t. 88) of Klotzsch and Garcke (1862), *P. splendens* is different from the Group B by short ochreae of uppermost cauline leaves and almost free styles. Accordingly, no name corresponding to the Group B has been published, so we regard this as a new species, *Bistorta rubra*, whose specific epithet derived from its deep red flowers.

Bistorta confusa (Meisn.) Greene, Leaf. Bot. Obs. Crit. 1: 21 (1904). [Fig. 7]

Polygonum confusum Meisn. in Wall., Pl. Asiat. Rar. 3: 53 (1843); Forbes and Hemsl. in J. Linn. Soc. Bot. 26 (176): 336 (1891), quoad nom. tant., excl. syn. et specim.; Dammer in Diels in Bot. Jahrb. Syst. 29: 313 (1901), quoad nom. tant., excl. specim.

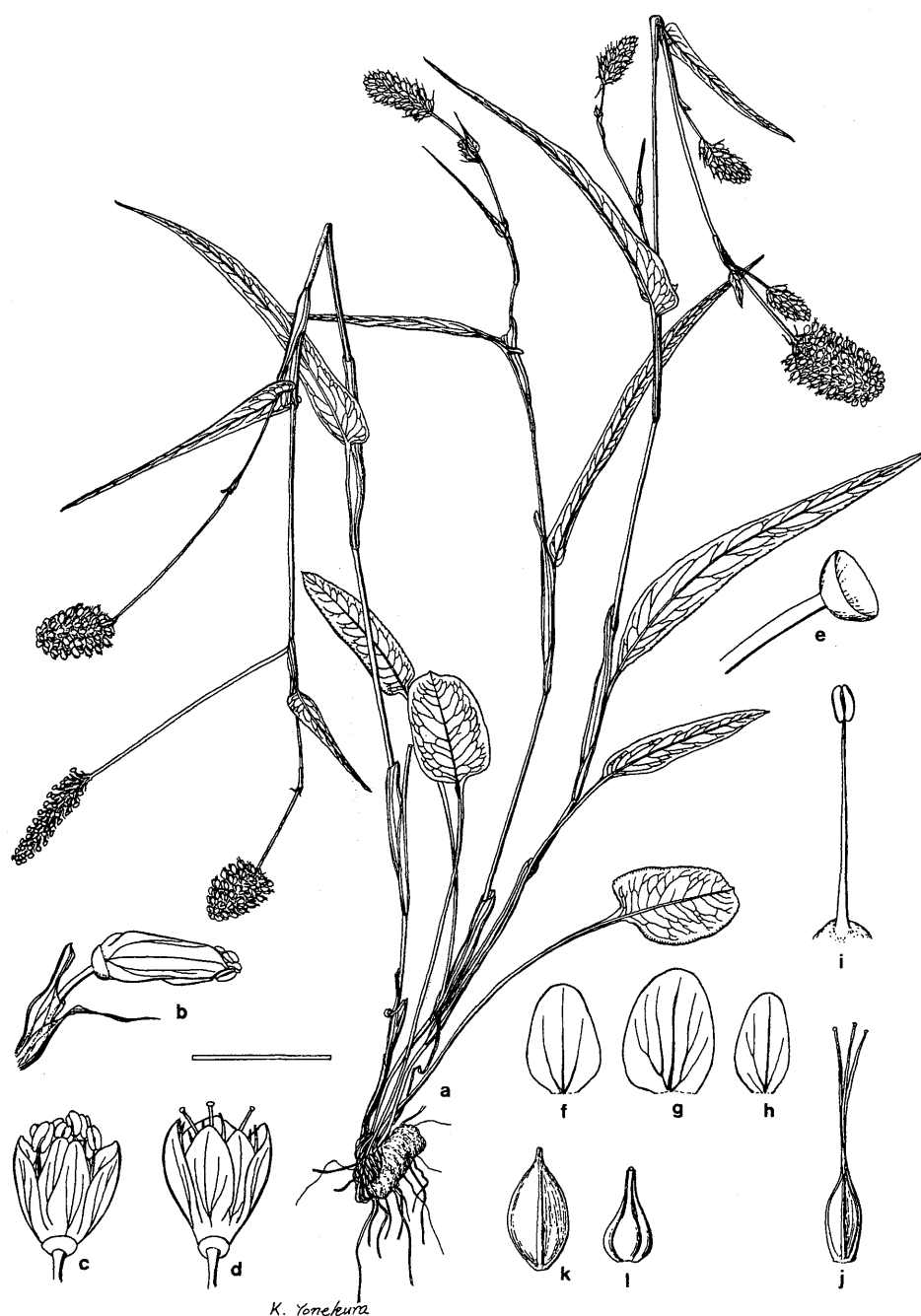
Bistorta milletii auct. non H.Lév.: H.Hara in Ohashi, Fl. E. Himal. 3: 30 (1976) & in H. Hara et al., Enum. Fl. Pl. Nepal 3: 173 (1982), p. p.; Polunin & Stainton, Fl. Himal. 345 (1984), p. p.; Stainton, Fl. Himal. Suppl. 52, p. p., pl. 93, n. 441 (1988).

Polygonum milletii auct. non (H.Lév.) H.Lév.: S. B. Malla et al., Bull. Dept. Med. Pl. Nep. 7 (Cat. Nep. Vasc. Pl.): 158 (1976), p. p.

A perennial herb. Rhizome short, 4–10 mm thick, tortuose, often covered with fibrous remnants of old leaf sheathes, white or pink inside. Radical leaves 2–5, often withering at flowering time, 12–30 cm long, long-petioled, blades lanceolate, narrowly oblong, ovate or orbicular, (1.2–)3–18 cm long, (0.5–)1–2.5(–3.5) cm wide, acute, obtuse or round mucronate at apex, truncate or subcuneate and decurrent to petiole at base, green above, glaucous beneath, glabrous on both side or pubescent beneath, veinlets thickened at margin. Stems erect or ascending, 9–45(–72) cm tall, 2–4(–5)-leaved, often branched from upper axils of cauline

leaves; branches sometimes taller than main stems at fruiting time, 1–2-leaved or leafless. Lower cauline leaves 7–13(–18) cm long, petioled, rarely sessile, blades lanceolate to oblong-lanceolate, 4–9(–11) cm long, (0.2–)0.5–2.6 cm wide, acute to acuminate at apex, cuneate, rarely truncate at base; middle and upper cauline leaves sessile and amplexicaul, triangular-lanceolate, acuminate at apex, cordate at base, veinlets not thickened at margin; middle ones 3–12 cm long, 6–28 mm wide, upper ones much smaller. Ochreae membranous, brownish; those of highest cauline leaves much shorter than subsequent leaf sheaths. Inflorescences spike-like, racemose, 11–37 mm long, 10–18 mm thick, each node 1-flowered; bracts 4.7–6 mm long, pale brownish with brown costae, acuminate, membranous; pedicels 3.5–5 mm long, white or reddish, apex often enlarged forming cup-shaped appendages to 1.2 mm diam. Flowers reddish purple or rose-red, protandrous, 3.3–4.8 mm long; tepals 5, oblong to elliptic, obtuse, 3-nerved; stamens 8, subequal to tepals, 2.7–4 mm long, filaments reddish, anthers dark purple, nectaries at the base of filaments, dark purple; styles 3–3.5 mm long at a female stage, reddish, base connate at 1/5–1/4 of their length, stigmas capitate, dark purplish; ovaries trigonous with acutish ridges at upper portion and with obscure ridges at lower portion, 1.3–1.8 mm long. Achenes dimorphic; in the most individuals thinly ovoid with three obscure ridges, 2.2–2.8 mm long, greenish, not lustrous, shortly beaked at apex; in some individuals ovate, trigonous, ca. 3.5 mm long, brown, lustrous as other *Bistorta* species.

Type: “Gossain Than, Kumaon et Sirmore” (Probably collected by Wallich’s collector in or around Gosainkund, Bagmati Zone, C. Nepal). (Wall. Cat. no. 1683, Syntypes in LINN, not traceable).



K. Yonekura

Fig. 7. *Bistorta confusa* (Meisn.) Greene. a. habit. b. flower in male stage, lateral view. c. flower in male stage, bottom view. d. flower in female stage, bottom view. e. apex of pedicel. f. inner tepal located in upper side. g. outer tepal. h. transitional tepal. i. stamen of inner wheel with nectaries. j. pistil. k. & l. achene. Scale Bar = 3 cm in a; 4 mm in b–h, k & l; 8 mm in i & j. Voucher specimen: a–i & l; Mikage et al. 9552198 (TUS). j; Troth 982 (NY). k; Stainton et al. 8656 (BM).

Possible Isosyntypes: sine loco spec. (collector and date unknown, NY-MEISN! – bearing Meisner's annotation); Nepaliae et Indiae Orientalis, sine loco spec. (Wall. Cat. no. 1683, E!, G-DC Microfische! – bearing Meisner's annotation).

Other specimens examined.

NEPAL: Sagarmatha Zone, Solukhumbu Distr., around Pike Dongshar, 3510m (H. Ohba et al. 8541217, TI); Janakpur Zone, Okhaldhunga Distr., Pike, near Okhaldhunga, 3000-3500m (K. Itoh I-16, KYO); Ramechhap Distr., Dubikharka–Baula Pokhari (H. Ohba et al. 8570315, TI); Dolakha Distr., Jhakuri Rol, 10000 ft. (P. R. Shakya et al. 2653, KATH); Kalingchok, 11000 ft. (M. L. Banerji et al. 2791, KATH); Bagmati Zone, Sindhupalchok Distr., Kalingchok, Tale Bisauma–Tingoang, 3100 m (H. Kanai et al. 675137, KATH, TI); Tsedang Pokhari, 3000 m (H. Kanai & S. B. Malla 674656, KATH, KYO, TI); Rheychet, 3300 m (A. Maire 353, BM); E. of Dobato, 28°12'N, 85°30'E, alt. 3000 m (J. H. de Haas 2811-b, BM); Nuwakot Distr., Gopte–Thale Patil, alt. 3400 m (H. Kanai et al. 721988, TI); Thale Patil, 3400 m (H. Kanai et al. 721988, TI); Thale Patil–Mangen (H. Kanai et al. 721991, TI); Kathmandu and Sindhupalchok Distr., Shioupuri Ridge, Sundarija–Pati Banjyang–Gul Bhajyang–Mangengot, alt. 2000–3300 m (H. Idzumi & M. Togashi s. n., 15–25 Sep. 1979, TI); N. of Khumsang, 27°58'N, 85°30'E, alt. 3200 m (J. H. de Haas 2099, BM); Bhanjyang, N. of Kathmandu, ca. 2800 m (C. Grey-Wilson & Phillips 145, BM, K); Kathmandu Distr., Shiopuri, 2500 m (H. Idzumi & M. Togashi s. n., 28 Sep. 1978, KYO, TNS); Rasuwa Distr., Louri Binay, 10–12000 ft. (L. Dhwoj 19, K); Domze, 9950 ft. (N. P. Manandhar 92, KATH); Gossain Than Napaliae (Gosain Kund) (Wallich's cat. no. 1683, BM, excl. a bottom plant); Gosainkund, 11500 ft. (J. D. A. Stainton 7219, E); Gosainkunda, 13600 ft. (N. P. Manandhar 135, KATH); Satsae Khola, 28°13'N, 85°10'E, alt. 3700 m (J. F. Dobremez 601, BM); Raro, 4150 m (B. Yon 381, BM); Chilime Kharka–Chilimagoan, 12000 ft. (O. Polunin 1459, BM); Ganesh Himal, Parbati Kund (near Gatlang)–Yure Kharka, 28°09'N, 85°14'E, 2770 m (F. Miyamoto et al. 9410030, TI, TNS); a Kharka near Ganesh Base Camp–a Pass–Chyauche Kharka, 28°15'N, 85°06'E, 3980 m (F. Miyamoto et al. 9410257, TI, TNS); Dhading Distr., Tiru Danda, S. of Ganesh Himal, 13000 ft. (J. D. A. Stainton 5108, BM); Gandaki Zone, Kaski Distr., Lamjung Himal, Rambrong, 10000 ft. (J. D. A. Stainton et al. 5972, BM); *ibid.*, 11000 ft. (J. D. A. Stainton et al. 8656, A, BM, TI); *ibid.*, 12000 ft.

(J. D. A. Stainton et al. 5993, A, BM, TI); South of Annapurna, above Siklis, ca. 3000 m (R. G. Troth 982, BM, NY & TI); Annapurna Himal, Seti Khola, 11000 ft. (J. D. A. Stainton et al. 6682, BM, TI); Ghorepani, 2700 m (H. Tabata et al. 6071, KYO); *ibid.*, 3000 m (H. Tabata et al. 19094, KYO); Dhawalagiri Zone, Parbat Distr.: Banthanti–Ghorepani, below Ghorepani, alt. 2620 m (M. Mikage et al. 9552198, TUS); Ghorepani–Banthanti, alt. 2720 m (M. Mikage et al. 9470576, TUS); Ghorapani (Ghodapani), 9500 ft. (T. B. Shresta & M. S. Bista 1959, KATH); Myagdi Distr., Paudwar–Ghorapani, alt. 2600 m (M. Suzuki et al. 8881753, TI); C. Nepal, District unknown, Adang Sadza, 8000 ft. (F. M. Bailey's collectors 24, BM); Ohiyak, 13000 ft. (L. Dhwoj 38, BM); sine loco spec. (L. Dhwoj 85, E).

Distr.: Endemic to central and eastern Nepal (eastward from Kali Gandaki Valley, westward from Dudh Koshi Valley).

Bistorta rubra Yonekura et H. Ohashi, sp. nov. [Fig. 8]

Bistorta milletii auct. non H. Lév.: H. Hara in Hara et al., Enum. Fl. Pl. Nepal 3: 173 (1982), p. p.

Polygonum milletii auct. non (H. Lév.) H. Lév.: S. B. Malla et al. in Bull. Dept. Med. Pl. Nep. 7 (Cat. Nep. Vasc. Pl.) 158 (1976), p. p.

P. sphaerostachyum auct. non Meisn.: Meisn. in DC., Prodr. 24 (1): 125 (1856), p. p.; Hook.f., Fl. Brit. Ind. 5: 32 (1886), p. p.

P. macrophyllum auct. non D. Don: Babington in Trans. Linn. Soc. (London) 18: 95 (1838); Steward in Contr. Gray Herb. no. 88: 36 (1930), p. p.

Haec species *Bistortae sherei* et *B. milletii* affinis, sed ab anteriori foliis latioribus oblongis non linearibus, floribus majoribus vulgo rubris, stylis basi ad 2/5–1/2 connatis differt; a posteriori foliis oblongis, ochreae foliorum caulinis summis quam vaginis foliorum longioribus vel subequaribus, floribus minoribus tepalis ellipticis differt. A *B. confusa* caule simplici, foliis caulinis superioribus linearibus non amplexicaulibus, ochreae foliorum caulinis summis vaginis foliorum longioribus, floribus vulgo rubris distinguitur.



Fig. 8. *Bistorta rubra* Yonekura & H. Ohashi, sp. nov. a. habit. b. bract. c. flower in female stage, lateral view. d. flower in female stage, bottom view. e. inner tepal located in upper side. f. outer tepal. g. transitional tepal. h. stamen of inner wheel with nectaries. i. pistil. A vertical bar indicating connate part. j. degenerated pistil often observed in flowers blooming later. k. achene. Scale Bar = 3 cm in a; 4 mm in b–g, j & k; 8 mm in h & i. All drawn from holotype, Mikage et al. 9682662 (TUS).

Herba perennis. Rhizoma breve ad 5.5 cm longum saepe tortuosum, intus album vel leviter rubescens. Folia radicalia 8–28 cm longa; laminis 4.5–21 cm longis 0.6–5 cm latis, anguste oblongis vel anguste ovato-oblongis, apice obtusis vel acutis, basi cuneatis in petiolum decurrentibus, chartaceis, ad margine leviter revolutis, nervis ad margine plus minusive crassis, subtus glabris vel pubescentibus; petiolis 4–20 cm longis, albis saepe purpurascens. Caules erecti vel leviter ascendentes, simplices, (8–)18–45(–52) cm alti, 2–4-foliati, albi saepe purpurascens. Folia caulina inferiora anguste oblonga vel late linearia, (3.5–)4.5–12(–20) cm longa, 2–23(–42) mm lata, petiolata, apice obtusa vel acta, basi cuneata vel attenuata; superiora valde minora, linearia, sessilia. Ochreae castaneae membranaceae, quae foriorum caulinae summae vaginis foliorum longiores vel subequales. Inflorescentiae unicae terminales, subglobosae seu cylindricae pseudoracemosae spiciformes, 14–47 mm longae, 10–18 mm crassae, nodis 1–2-floriferis. Pedicelli 2.6–3.5 cm longi, bracteis subequales. Flores 3.4–5 mm longi, rubri rarissime rosei, horizontaliter compressi, plus minusive cernui; tepalis 5, ellipticis, apice rotundis, trinerviis; Stamina 8, filamentis rubris, antheris atropurpureis; Stylis 3, basi 2/5–1/2 connatis, rubris, stigmatibus capitatis; ovariis trigonis. Acheniae brunneae late ovatae trigonae, apice brevirostratae.

Type. NEPAL: Dhawalagiri Zone, Baglung Distr., West of Jalja La, Upper reach of Gurjaghat Khola, alt. 3230 m (M. Mikage, R. Hirano, A. Takahashi & K. Yonekura 9682662, 16 Sep. 1996, Holotype in TUS).

Other specimens examined.

NEPAL: Dhawalagiri Zone, Myagdi Distr, Ridge SE of Jalja La, 3360 m (M. Mikage et al. 9682639, TUS); Dhorpatan, very moist floodplain of Utar Ganga, eastern end of valley, 3370 m (R. G. Troth

295, TI); Baglung Distr., west of Jalja La, upper reach of Gurjaghat Khola, 3250 m (M. Mikage et al. 9682661, TUS); near Dhorpatan, 10000 ft. (J. D. A. Stainton et al. 9013, A, BM, TI); Rapati Zone, Rukum Distr., Sajbari area, 13000 ft. (T. B. Shresta 13, BM, KATH); above Ranmagaon, 11000 ft. (J. D. A. Stainton et al. 3330, A, BM, KATH, TI); Karnali Zone, Dorpa Distr., near Balangre Pass, 3500 m (N. K. Bhattarai & M. N. Subedi 87-195, KATH); Balangra Pass, 12000 ft. (H. Tabata et al. 3380, KYO); Mugu Distr., Rara, 2900 m (N. P. Manandhar & D. P. Joshi 8035, KATH); ibid., 2909–3560 m (H. Tabata et al. 3082, 12794, 12882, 15369 & 15544, KYO); Between Lumagaon (Jumla Distr.) and Rara (Mugu Distr.), 3600m (H. Tabata et al. 23063, KYO); Jumla Distr., Padmara, 2800 m (N. P. Manandhar & D. P. Joshi 6870, KATH); Dori Lekh, 3200m (K. R. Rajbhandari & B. Roy 4358, KYO); ibid., 3500m (K. R. Rajbhandari & B. Roy 3406, KYO); Chakhure Lekh, 3300 m (N. P. Manandhar & D. P. Joshi 6632, KATH); Gothichaur–Jumla, 2690 m (N. K. Bhattarai & M. N. Subedi 87-282, KATH); Chauwer Khola–Sija, 3480m (H. Tabata et al. 22875, KYO); Babaria Lekh, Naphukona, 10500 ft. (O. Polunin et al. 95, BM, E); Sialgarhi, near Chaudhabise Khola, 9300 ft. (O. Polunin et al. 2104, BM, E); SE. of Jumla, between Garjankot and Kunrigaon, 10500 ft. (O. Polunin et al. 4877, BM, E); Ghurchi Lekh, between Lumra and Murma, 12500 ft. (O. Polunin et al. 5136, BM, E); Seti Zone, Bajura Distr., Porakya Pass, 2575m (H. Tabata et al. 2601, KYO); Bajhang Distr., Ghodi Lekh, 3181m (H. Tabata et al. 2424, KYO), ibid., 4000 m (M. S. Bista & D. P. Joshi 533, KATH); Thogundanda, 3000 m (M. S. Bista & D. P. Joshi 743, KATH); Thogundanda–Kaligad, 11500 ft. (T. B. Shresta 4197, TI); Kali Gad, 10000 ft. (J. D. A. Stainton 4919, BM); Mahadev Sera, 3900 m (P. R. Shakya et al. 8149, KATH); Doti Distr., Khaptad Lekh, 2900 m (P. R. Shakya et al. 6251, KATH); Khaptad (the King Mahendra Shah s. n., ann. 1966, KATH); ibid., 12200 ft. (K. Itoh & S. B. Rajbhandari 1263, KATH); Rikhra–Chuyadhara, 2850 m (H. Tabata et al. 1027, KATH, KYO); W. Nepal, district unknown, Gadhibasa forest (Bis Ram 485, NY); W. Nepal, sine loco spec. (F. M. Bailey s. n., ann. 1936, E).

INDIA: Uttar Pradesh, E. Kumaon (J. F. Duthie s. n., ann. 1888, K); Kumaon, above Bona, 8500 ft. (W. Koelz 883, NY); Garhwal, without precise locality (T. Thomson 1285, K; collector unknown, 9 Aug. 1885, E); Kuari Pass, 13000 ft. (J. F. Duthie 4364, BM); Chamori Distr., around Chopta, 3000m (T. Shimizu 37826, KANA); Chopta–Thungnath, 3000–3300m (T. Shimizu 37851, KANA); Tungnath, 9000 ft. (M. P.

Edgeworth s. n., ann. 1844, K); Toongnath, 11000 ft. (M. Madden s. n., date unknown, K); Dudutoli (Doodootolee), 10000 ft. (R. Strachey & J. E. Winterbottom 1, BM, GH, K; M. Madden s. n., date unknown, K); N. Garhwal, Poishtola, 3800m (M. A. Ran 10299, E); Punjab, without precise locality (J. R. Drummond 26766, K); Himalaya Boreali-Occidentalis, regio temp. alt. 8–10000 ft. (T. Thomson s. n., date unknown, GH).

Distr.: Western Nepal (westward from Kali Gandaki Valley) to northern India (to Garhwal).

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Appendix

Voucher specimens for Figs. 3 and 5.

Bistorta milletioides H. Ohba & S. Akiyama

NEPAL: Mechi Zone, Taplejung Distr., Banduke Pokhari–Saju Pokhari (H. Kanai et al. 723993, TI); Rato Pokhari (Jumleypokhari–Rato), 13500 ft. (T. B. Shresta & D. P. Joshi 322, BM, KATH); Jaljale Pokhari, alt. 4000 m (J. F. Dobremez 1648, BM); Koshi Zone, Sankhuwasabha Distr., Jaljale Himal, Tin Pokhari (4130 m)–Banduke (4150 m) (H. Ohba et al. 9110184,

24 Jul. 1991, TI – Holotype); Tudam, 11300 ft. (L. W. Beer et al. 8362, BM); Khumbakarna Himal, Lower Barun Valley, alt. 4850 m (T. Wraber 34573, BM); Yangri Kharka–Ta Dasa, alt. 3540–3900 m (M. Suzuki et al. 8822701, TI); Iswa Khola, 13500 ft. (L. W. Beer 25436, BM); *ibid.*, 14000 ft. (L. W. Beer 10004, BM); Janakpur Zone, Ramecchap Distr., Chhu Ningma–Jata Pokhari, alt. 4040–4220 m (H. Ohba et al. 8570410, TI); below Jata Pokhari, 3780 m (M. Suzuki & N. Kurosaki 8541104, TI); Botase Kharka–Koshing Kharka, alt. 4000–4500 m (H. Ohba et al. 8570613, TI); Bagmati Zone, Sindhupalchok Distr., Yangri Danda, alt. 4100 m (J. H. Haas 2746, BM); Rasuwa Distr., Langtang, alt. 3750 m (Durham Univ. Himalayan Exped. 200, BM); Bheding, 12–13000 ft. (L. Dhwoj 320, BM); Ganesh Himal, a Kharka near Ganesh Base Camp–a Pass–Chyauche Kharka, 28° 15' N, 85° 06' E, 3930 m (F. Miyamoto et al. 9410258, TI, TNS); Gandaki Zone, Manang Distr., Bimtakothi, 12500 ft. (D. G. Lowndes 1439, BM, TI); Kaski Distr., Rambrong, Lamjung Himal, 13500 ft. (J. D. A. Stainton et al. 6252, BM, TI).

Bistorta sherei H. Ohba & S. Akiyama.

NEPAL: Koshi Zone, Sankhuwasabha Distr., Jomle (4000 m)–a col (4190 m)–Gola (4130 m) (H. Ohba et al. 9120235, 5 Aug. 1991, TI–Holotype); Janakpur Zone, Ramecchap Distr., Baula Pokhari–Chhu Ningma, alt. 3960–4040 m (H. Ohba et al. 8530236 & 8570379, TI); Bagmati Zone, Rasuwa Distr., Khola Kharka, 13500 ft. (O. Polunin 1091, BM); Mul Kharka, alt. 3900 m (H. Kanai & P. R. Shakya 672271, KATH, TI); Ganesh Himal, Pabil Kharka–a Pass–a Kharka (near Seto Kund), 28° 15' N, 85° 07' E, 4160 m (F. Miyamoto et al. 9410227, TI, TNS); a Kharka (near Seto Kund)–cross a river–Burindan Kharka, 28° 16' N, 85° 06' E, 4050 m (F. Miyamoto et al. 9410230, TI, TNS); Gandaki Zone, Gorkha Distr., around Thanmanang Kharka,

alt. 4150 m (M. Suzuki et al. 9470328, TUS); Kaski Distr., Annapurna Himal, Seti Khola, 13500 ft. (J. D. A. Stainton et al. 6561, BM, TI); C. Nepal, District unknown; Kalanki, 12–13000 ft. (L. Dhwoj 465, BM); Yelley, 14–15000 ft. (L. Dhwoj 464, BM).

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米倉浩司^a, 大橋広好^b: *Bistorta milletii* H.Lév. に類似するネパール産タデ科植物の分類学的検討

中国雲南省から記載された *Bistorta milletii* H.Lév. は基部が葉柄に流れる根出葉と紅紫色の大形の花で特徴づけられる美しい植物である。ネパールにも根出葉や花色の点において同様の特徴を持つ植物が分布しており、それらはこれまで *B. milletii* に当てられてきた。ところが、ネパールのものは実は真の *B. milletii* とは花の大きさや上部の茎葉の形態等の点で異なっており、さらにネパール中部を南北に流れる Kali Gandaki 川を境として異所的に分布する 2 つの種からなることが明

らかとなった。ネパールの 2 種は、花茎の分枝の有無、葉形、上部の茎葉における托葉鞘の長さ、小花柄の先端部の形、子房の形態等の諸形質によって明瞭に区別できる。

Kali Gandaki 川以東の東～中部ネパールに分布する型には既に *Polygonum confusum* Meisn. という種名が与えられているが、この名はその実体が正しく認識されないまま異なった植物に適用されてきた。リンネ協会の East Indian Herbarium にあった本種のタイプは現在行方不明となっているが、

他の標本室に保管されている重複標本を調べることによって、この名が本型に適用されるべきことを明らかにした。従って、この型に対する *Bistorta* 属の下での正名は *Bistorta confusa* (Meisn.) Greene である。

Kali Gandaki 川以西の西ネパール～北インドに分布する型は、東～中部ネパールに分布する *Bistorta sherei* H. Ohba & S. Akiyama に近縁であるが、葉が幅広く花も大きく、花柱基部の癒合部がより長いので区別できる。さらに、分布域や生育環境の点でも異なっており、別種とするのが妥当と結

論したので、新種 *Bistorta rubra* Yonekura & H. Ohashi として記載した。

なお、近年東ネパールから記載された *Bistorta milletoides* H. Ohba & S. Akiyama は、東～中部ネパールに点々と分布することが明らかとなった。この種は高山帯の岩場に生じて茎や葉は普通下垂し、托葉鞘も長く花はピンク色であるなどの点で上記の種から明らかに区別できる。

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